APPENDIX A

Soil Gas Survey Report Prepared by
Pine & Swallow Associates, Inc.

Limited Subsurface Investigation

I.S.R.T Site
Commerce Way and Atlantic Avenue
Wouburn, Mass

Prepared for

Roux Associates, Inc.
13 Branch Street
Methuen, MA 01844

Prepared by

PINE & SWALLOW ASSOCIATES, INC.
Environmental Scientists, Engineers and Designers

867 Boston Road
Groton, MA 01450
978-448-9511

December 3, 1997
PSA Reference Number: 97141

Pine & Swallow Associates, Inc.

Environmental Science, Engineering and Design

867 Boston Road, Groton, MA 01450
(508) 448-9511 Fax (508) 448-6645

Principals: Robert N. Pine, P.E.
John C. Swallow, Ph.D.

December 3, 1997

Larry McTiernan
Roux Associates, Inc.
13 Branch Street
Methuen, MA 01844

RE: ISRT, Woburn, Mass

Dear Larry,

In accordance with your request, Pine & Swallow Associates (PSA) has prepared this summary report of subsurface investigations performed at ISRT. This report summarizes the equipment and procedures employed by PSA for soil gas sampling, as well as the results of on-site gas chromatograph analyses of soil gas and water.

We appreciated the opportunity to work with you and thank you for engaging our services for this project. If there are any questions, please do not hesitate to call.

Sincerely yours,
Pine & Swallow Associates, Inc.

Gregory S. Rotondi
Environmental Chemist

Jeffrey A. Curtis
Senior Project Manager

Enclosure

Limited Subsurface Investigation
I.S.R.T Site
Commerce Way and Atlantic Avenue
Woburn,Mass

I. INTRODUCTION AND PROGRAM SUMMARY

On November 10, 11 and 18, 1997, Pine & Swallow Associates, Inc. (PSA) conducted limited subsurface investigations of the ISRT site. The purpose of PSA's effort was to assist Roux Associates, Inc. in assessing soil gas and ground water conditions at the site. Details of equipment and procedures for MicroWell® installation, soil gas sampling and the methodology and results of on-site gas chromatographic (GC) analyses of soil gas and ground water samples for selected volatile organic compounds are enclosed.

Program Summary

PSA's study included soil gas sampling at thirty-eight locations. At one location a soil gas sample was not attainable so a water sample was taken and analyzed. Soil gas samples were collected from two to four feet below ground surface (BGS) and were analyzed with an HP5890 GC for benzene and toluene in PSA's mobile laboratory. Six groundwater samples collected by Roux Associates field personnel were also analyzed by PSA.

All installation and sampling locations were chosen by Roux Associates, Inc. field personnel. All analyses were performed in PSA's field laboratory for compounds determined by Roux Associates, Inc.'s program.

® MicroWell and VibraDrill are registered trademarks of ProTerra, Inc., an affiliate of PSA.

II. FIELD INVESTIGATION METHODS AND PROCEDURES

SOIL GAS INVESTIGATION

Soil Gas Equipment and Methods

Soil gas analysis refers to gas chromatographic (GC) analysis of the soil atmosphere (soil gas) to detect volatiles originating from contaminated soil, from a contaminant ground water plume or from pure product floating on the ground water surface. Soil gas analysis allows comparison of concentrations of volatile constituents over an array of test locations to indicate pertinent dimensions of a discharge or plume.

Soil gas samples were obtained by driving a half-inch, steam-cleaned, hollow steel probe fitted with a drive point to a selected depth below grade with one of PSA's VibraDrills The probe was then pulled back and a rod was used to drive the point beyond the end of the probe thereby creating a sampling cavity.

Samples were collected by sealing the top of the sampling probe with a tubing adapter which connects to a monitoring panel and vacuum pump. Ten volumes of air were purged from the sampling system by use of a battery powered pump. During purging, flow and pressure measurements were recorded.

To collect a soil gas sample for GC analysis, the sampling tubing was isolated from the vacuum pump by a selector valve. After purging of the MicroWell, a gas sample was withdrawn through a silicon rubber section of the sampling tubing with a 10 mL syringe. The syringe needle was capped with a septum and the sample delivered immediately to the mobile laboratory. Thirty-eight samples were logged in by the chemist with a chain of custody form which includes the syringe ID, sampling location and sample depth, and analyzed according to PSA's analytical SOP.

GROUND WATER INVESTIGATION

Six Groundwater samples were collected by Roux Associates, Inc. field personnel and one groundwater sample was collected by PSA for field analysis. PSA provided preserved vials for collection and on site analysis in PSA's mobile laboratory.

FIELD CHEMISTRY

PSA utilizes Hewlett Packard 5890 gas chromatographs to analyze soil, water and soil gas matrices for a variety of organic environmental contaminants. Gas chromatography (GC) technology physically separates the components of a contaminated matrix and the contaminants are then identified using compound-specific detectors. PSA's GC instrumentation currently employs three different detection modes. The electron capture detector (ECD) is primarily used to identify electromagnetic molecules such as chlorinated, brominated and fluorinated compounds. The photoionization detector (PID) is effective in the determination of aromatic and/or aliphatic contaminants such as benzene, toluene, ethylbenzene and xylenes (BTEX). Analysis is conducted in accordance with PSA's Standard Operating Procedures (SOPs).

For water and soil headspace sample matrices which are analyzed to determine BTEX/MTBE and chlorinated contaminants, field samples undergo preparation steps prior to analysis. For water samples (collected in 40 mL VOA vials), an aliquot of the water sample is removed from the closed sampling vial to create headspace within the vial. Samples are warmed to ambient temperature, agitated briefly and the headspace within the vial is allowed to reach equilibrium for a short period. An aliquot of the headspace is withdrawn by gas-tight syringe and injected into the on-site gas chromatograph for analysis. PID/ECD detector modes are utilized for compound identification.

An appropriate analytical capillary column is selected for the suite of analytes under study. Once the sample is prepared for analysis and introduced into the GCs heated inlet injection port, it is transported in its gaseous form to the analytical column. As a sample migrates through this column, its various components interact with the column film to become temporarily adsorbed and subsequently desorbed. Each compound in the test sample transits the column at a different rate which is temperature controlled and enhanced, hence creating a unique retention time. Each compound also elicits a unique response from the detectors. These responses are translated within the data collection system in the form of peaks which are assigned height and area values relative to analyses of analytical standards. This data is subsequently evaluated to determine concentration of the target analyte within the sample matrix.

Identification and quantification of target analytes detected in the sample are achieved by retention time comparisons to reference standards formulated with analytical grade compounds of known concentrations. For all analyses, blank samples from syringes, sampling equipment and reagents are analyzed periodically to ensure sample and method integrity. Daily check standards are run to verify instrument stability, calibration, sensitivity and performance. Duplicate analyses and replicate sample injections are routinely conducted to support method accuracy and analytical precision.

III. ANALYTICAL RESULTS

SOIL GAS ANALYSES

Thirty-eight locations chosen by Roux Associates, Inc. field personnel were sampled for soil gas at depths ranging from two to four feet BGS using PSA's VibraDrill K100. Thirty-eight soil gas samples were analyzed for bezene and toluene on a Hewlett Packard 5890 GC in PSA's field laboratory.

Results of soil gas analyses for the compounds selected by Roux Associates, Inc. field representatives and performed at ISRT are included in the Appendix. Results of soil gas analyses showed benzene and toluene were not present in amounts greater than the practical quantification limit.

Negative soil gas findings at a test location do not guarantee that the soil or ground water at depth is free of contaminants because geologic and or hydrologic conditions may be present that prevent upward diffusion of volatiles from deeper horizons. For example, a part of a contaminant plume that is overlain by clean water typically cannot be detected in the soil atmosphere. Experience with soil gas reconnaissance also shows that the distance a contaminant plume can be traced from a source depends on geologic, hydrologic and man-made features that are unique to each site. Additionally, positive findings at a sampling location can arise from soil contamination only and do not confirm that the underlying ground water has been impacted.

GROUND WATER ANALYSES

Seven ground water samples were analyzed for benzene and toluene by a Hewlett Packard 5890 GC in PSA's field laboratory. Results of the ground water analyses are tabulated in Table 1.

TABLE 1
On Site Volatile Organic Analysis
ISRT, Site Address
Ground Water
11-18-97
[ppb]

Sample ID	Sample Depth	Benzene	Tolune	NOTES
C-2	0-8	<PQL	1.0	
GWA-2	0-8	<PQL	<PQL	
GWE2	0-8	<PQL	<PQL	
GWG2	0-8	<PQL	<PQL	
G-4	0-8	<PQL	<PQL	
GW-4	0-8	<PQL	<PQL	
SG22	0-4.0	<PQL	<PQL	water sample from soil gas point
Reporting Limits		<1.0	<1.0	

<PQL indicates analyte below method reporting limit
NA=not analyzed

Ground water samples were analyzed for benzene and toluene as determined by Roux Associates, Inc.'s program. Results showed benzene and toluene were not present in amounts greater than the practical quantification limit.

This report is submitted subject to the limitations stated in the Appendix.

APPENDIX

Analytical Results

Limitations and Conditions

LIMITATIONS AND CONDITIONS

1. The observations described in this report were made under the conditions stated. The conclusions presented in the report were based solely upon the services described and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by Client. The report has been prepared in accordance with generally accepted hydrogeological and hydrochemical practices. No other warranty, express or implied, is made.

2. Negative findings for the presence of volatile organic compounds using soil atmosphere analysis are not positive or absolute proof that disposal or discharge of chemicals has not occurred in the past at the sampled locations or anywhere else on the site. Negative findings are not positive or absolute proof that migration, seepage or any other movement of chemicals is not occurring at the sampled locations or elsewhere on the site.

3. Chemical conditions reported herein reflect conditions at the locations tested within the limitations of the methods used. Such conditions can vary rapidly from area to area. No warranty is expressed or implied that chemical conditions other than those reported do not exist within the site.

4. At those locations where volatile organic compounds were reported, chemicals other than those reported may be present. Chemical analyses have been performed for specific parameters during this assessment. However, additional chemical constituents not searched for during the current study may be present in soil and/or ground water at the site.

5. This report has been prepared for Roux Associates, Inc. solely for use in an environmental evaluation of property at ISRT, Woburn Mass.

Roux Associates, Inc.
Project: ISRT Site
PSA Reference Number: 97141

December 3, 1997
Appendix

Analytical Results

Roux Associates, Inc.
Project: ISRT Site
PSA Reference Number: 97141

December 3, 1997
Appendix

TABLE 1
On Site Volatile Organic Analysis
ISRT, Site Address
Soil Gas Analysis 11-10-97 /11-11-97
[ppbv]

Sample ID	Sample Depth	Benzene	Tolune	
SG1	3.5-4.0	<PQL	<PQL	
SG2	3.5-4.0	<PQL	<PQL	
SG3	3.5-4.0	<PQL	<PQL	
SG4	3.5-4.0	<PQL	<PQL	
SG5	3.5-4.0.	<PQL	<PQL	
SG6	3.5-4.0	<PQL	<PQL	
SG7	3.5-4.0	<PQL	<PQL	
SG8	3.5-4.0	<PQL	<PQL	
SG9	3.5-4.0	<PQL	<PQL	
SG10	3.5--4.0	<PQL	<PQL	
SG11	3.5 4.0	<PQL	<PQL	
SG12	3.5-4.0	<PQL	<PQL	
SG13	3.5-4.0	<PQL	<PQL	
SG14	3.5-4.0	<PQL	<PQL	
SG15	3.5-4.0	<PQL	<PQL	
SG16	3.5-4.0	<PQL	<PQL	
SG17	3.5-4.0	<PQL	<PQL	
SG18	3.5-4.0	<PQL	<PQL	
SG19	3.5-4.0	<PQL	<PQL	
SG20	2.5-4.0	<PQL	<PQL	
SG21	3.5-4.0	<PQL	<PQL	
SG23	3.5-4.0	<PQL	<PQL	
SG24	2.5-4.0	<PQL	<PQL	
SG25	3.5-4.0	<PQL	<PQL	
SG26	3.0-3.5	<PQL	<PQL	
SG27	3.0-3.5	<PQL	<PQL	
SG28	3.5-4.0	<PQL	<PQL	
SG29	3.0-3.5	<PQL	<PQL	
SG30	3.5-4.0	<PQL	<PQL	
SG31	3.5-4.0	<PQL	<PQL	
SG32	3.5-4.0	<PQL	<PQL	
SG33	3.5-4.0	<PQL	<PQL	
SG34	3.5-4.0	<PQL	<PQL	
SG35	3.5-4.0	<PQL	<PQL	
SG36	3.5-4.0	<PQL	<PQL	
SG37	3.0-3.5	<PQL	<PQL	
SG38	2.0-2.5	<PQL	<PQL	
SG39	3.5-4.0	<PQL	<PQL	
Reporting Limits		<1.0	<1.0	

<PQL indicates analyte below method reporting limit
NA=not analyzed

APPENDIX B

Geophysical Survey Report Prepared by
Geophysics GPR International, Inc.

GEOPHYSICAL INVESTIGATION

INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

Presented to:

ROUX ASSOCIATES, INC.
13 Branch Street
Methuen, Massachusetts 01844

Presented by:

GEOPHYSICS GPR INTERNATIONAL, INC.
13 Highland Circle, Suite E
Needham Heights, Massachusetts 02194

January 7, 1998

GPR No. B97181
Roux No. 06626M15

CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

Magnetic and ground penetrating radar surveys were conducted for Roux Associates, Inc. at the Industri-Plex site in Woburn, Massachusetts. The geophysical surveys, covering several acres, were conducted on different days during the period of November 12 to 26, 1997. The objective of these surveys was to locate buried drums and/or small underground storage tanks (USTs) possibly located within the survey area.

The site locus is at the intersection of Atlantic Avenue and Commerce Way about one mile northwesterly of the intersection of Routes 95/128 and 93. The areas of investigation are part of a large former industrial facility. The general site area is bounded by Commerce Way, Route 93, and private properties (see Figure No. 1).

There is one large area of interest that was surveyed by magnetometry with portions of this area surveyed with ground penetrating radar. Overall, the investigated area is generally rectangular-shaped, open ground containing areas of dense brush, exposed bedrock, and wet areas, approximately 300 feet in an northeast-southwest direction and 600 feet in a northwest-southeast direction. The geophysical survey area was subdivided into two smaller areas, the Peninsula and the Ponds and West of River areas, due to the presence of a small river crossing the site and small ponds.

2.0 METHODS OF INVESTIGATION

2.1 Magnetic (Gradiometric) Method

The magnetic method employs a proton precession magnetometer to measure the total magnetic field (TMF) strength. The TMF is the actual field strength, which consists of any buried ferrous source superimposed on that of the earth. Local variations in the earth's magnetic field strength depend on the presence of ferromagnetic material, such as iron and magnetite.

Changes in the magnetic field strength near such materials are attributed to induced and remanent magnetization. A ferromagnetic material acquires an induced magnetization when placed in an external magnetic field. Remanent magnetization is permanent magnetization, which may be acquired during the manufacturing of steel products.

A gradiometer was used during this investigation. A gradiometer is simply a magnetometer with two magnetic field sensors, one mounted at a fixed height above the other. Two measurements are then taken at each station. The difference in the magnetic strength between the upper and lower sensors is the vertical magnetic gradient (VMG).

The VMG provides several advantages over the TMF strength, including 1) improved lateral resolution of anomalies; 2) increased sensitivity to shallow magnetic sources; and

3) since readings are taken almost simultaneously, the measured gradient is independent of temporal magnetic fluctuations. Since the earth's magnetic field constantly changes over the course of a day, a dedicated base station is usually positioned near the site or at a point that is frequently returned to (looping method) to take repetitive readings in order to correct for this diurnal variation. A base station was used due to the moderate size of the investigated area.

2.2 Ground Penetrating Radar (GPR) Method

Ground penetrating radar (GPR) employs high resolution radar to detect buried objects and subsurface stratigraphy. Many of the principles of GPR are similar to that of the seismic reflection method used in oil and gas exploration. The transmitting antenna emits brief pulses of electromagnetic energy into the ground. During the time between pulses, the receiving antenna records energy which has been reflected back to the surface.

Radar waves are reflected by interfaces between media with differing dielectric constants, such as geologic contacts, buried objects, or voids. The dielectric constant is controlled by factors such as water content, density, and composition. The depth of penetration is limited by the operating frequency of the transmitter and the electrical conductivity of the ground.

The GPR unit records the two-way travel time and the amplitude of the reflected signals. The typical radar anomaly produced by a cylindrical object, such as an intact drum, pipe, or tank, traversed at right angles, is a convex-upward hyperbolic reflection. The source of the anomaly is located at the apex of the hyperbola.

3.0 DATA ACQUISITION

3.1 Equipment

The magnetic survey was accomplished using a Scintrex Envi-Mag gradiometer. Each reading of the total magnetic field and vertical magnetic gradient strength was automatically stored in the memory portion of the unit along with the coordinates of the station, time, date, drift between stations, and statistical error. The data were transferred to a computer for further processing, including diurnal variations.

A GSSI SIR-3 ground penetrating radar system with 100 and 500 mHz antennas was used at this site. All field data were printed on an electrostatic recorder.

3.2 Survey Design and Procedures

A general grid was established by the field crew within which the gradiometric and radar surveys were conducted. Grid nodes were marked every fifty feet with non-magnetic construction pin flags and paint spots and station positions were marked every ten feet with paint spots across the areas in orthogonal directions.

The geophysical grid is coincident with and is superimposed on a 50 foot grid system established by Meridian Land Services, Inc. This grid system was intended for the use of Roux Associates personnel in the performance of a soil gas investigation. The geophysical grid laid out by Geophysics GPR utilizes distances and directions, that is feet north-south and east-west of a reference point.

Our geophysical grid reference point, designated 0N/0E, is located ten feet south of soil gas grid point E-3 (SG-19) on soil gas line 3. Therefore, the soil gas coordinate D-3 is coincident with our geophysical grid point 60N/0E, and soil gas coordinate F-3 is coincident with our geophysical grid point 40S/0E. This relationship is maintained throughout the survey.

Departures from the grid occurred at intervals within the surveyed areas, due primarily to the presence of dense brush, exposed bedrock, and wet areas. The gradiometric data acquisition was along parallel lines spaced every five feet with measurement stations located every five feet along each line. The radar data acquisition was along parallel lines spaced three feet apart with continuous measurements along each line.

The radar survey was performed mostly with the 500-mHz antenna to permit high resolution surveying. Lower frequency (80 and 100 mHz) antennas permit greater depths of exploration while reducing spatial resolution, so was infrequently used.

4.0 RESULTS

4.1 Magnetic (Gradiometric) Surveys

The processed gradiometric data are presented as 11"x 17" color contour maps (Figures 2, 3, 5, and 6). The color plots allow rapid visual assimilation of the geophysical information. The contour maps show the variation of two parameters across the site: (1) total magnetic field (TMF) strength and (2) vertical magnetic gradient (VMG) strength.

Interpretation of the gradiometric data involved identifying the geophysical responses from surface features noted by the geophysicist. A few geophysical responses at this facility are clearly due to known objects, such as buried utilities, surface drain grates, discarded ferrous objects, and fences. Most responses could not be explained by observed objects or features.

The total magnetic values are plotted in nanoteslas (Nt) and the vertical magnetic

gradient in Nt per meter (Nt/m), standard units of magnetic flux density. Referring to the color contour map of the magnetic data, the highest value is shown in red in both figures, indicating the areas of the highest concentration of ferrous objects. The blank areas represent places where data were not collected, for example, adjacent to fences.

The magnetic Interpretation map 4A displays the major features observed at the site. These identified anomalies are not attributable to any observed surface features such as fences, buried utilities, and discarded materials. A cross within an anomaly indicates the point of highest intensity and may serve as a target point.

Because this site contains known different ferrous features, it is possible to identify a magnetic anomaly as indicative of these features, particularly if they are defined as linear anomalies. The Interpretation map for the Peninsula area displaying the results of the magnetic surveys (see Figure No. 4A) shows several known features found affecting the magnetic data.

No Interpretation map for the Ponds and West of River area was generated since the magnetic anomalies could be accounted for by numerous observed surface ferrous objects such as car parts, construction debris, and discarded household items. Additionally, the bedrock appears to contain ferromagnetic minerals, with a number of anomalies directly associated with bedrock exposures.

The magnetic anomalies are outlined on Interpretation map 4A. These marked anomalies, most of them, include small, narrowly-defined features typically associated with small, shallowly buried ferrous objects, that is, the same as the observed discarded household items. The objects identified with an "A" represent those anomalies that appear to be significant. The outline of the magnetic anomalies was determined as the minimum extent of the anomalous response from the total field data.

Note that the size of the anomalous zones reflect the area of influence of the geophysical data. The anomalies represented will be larger than the actual objects producing the responses. Experience has shown that an anomaly should be defined as an anomalous response in both parameters.

The magnetic maps show a strong response in both measured parameters indicative of buried ferrous objects occurring mostly within the northern portion of the site. The magnetic data display areas of concentrations of ferrous objects. The magnetic data also exhibit linear anomalies, which are due to discreet features such as buried utilities, concrete barriers, and fences.

4.2 Ground Penetrating Radar

Ground penetrating radar (GPR) records obtained in the field are time sections. In order

to convert the two-way travel times to depth, the velocity of radar waves in the subsurface must be determined. Velocities can be calculated by surveying objects of known depth or using an averaging method based upon the nature of the site materials.

The objective of performing a GPR survey was to try to detect buried drums or USTs, hence the close line spacing of three feet. The radar penetration within the overall site was excellent with depths of penetration ranging from six to eight feet. Calibration of the radar signal was obtained over an iron storm drain pipe within the site.

Numerous subsurface objects were detected including stratigraphic interfaces, probable discarded debris, utilities, drainlines, and disturbed soils. Since GPR covered a substantial portion of investigated site, the results of both the gradiometric and radar surveys are described in the two following areas.

4.3 Peninsula Area

Includes the area referred to at the site as the "peninsula," which is a lobe of fill materials extending easterly into a wetland in the vicinity of the river channel and is included within our grid coordinates 60S/110N to 0E/180E.

Examination of the contour map of total field strength (see Figure No. 2) shows a large-scale positive amplitude magnetic anomaly, indicating a concentration of ferrous materials throughout the central portion of the area. Some effect of steel reinforced concrete barriers and chainlink fences are included in this concentration. However, no other ferrous source objects were observed on the surface.

Inspection of the vertical gradient map (see Figure No. 3) of the same area shows the large-scale magnetic anomaly resolved into numerous smaller anomalies. Any of these smaller anomalies could include one or more steel drums as ferrous source objects.

Comparison and correlation of radar and magnetic data from this area have resulted in an Interpretation map of this area (see Figure No. 4B). The 4B interpretation map shows locations of magnetic anomalies which correspond to recorded radar anomalies. In addition, Figure 4B shows several radar anomalies that do not correspond with magnetic anomalies shown on Figure 4A. For four of these radar anomalies, the character of the radar signal suggests the possibility of an object with a drum-like radar signal. These particular anomalies have been designated with the letter "A" on map 4B.

4.4 Ponds and West of River Area

The magnetic maps corresponding to this area (see Figure Nos. 5 and 6) show the strength of the total magnetic field and the vertical magnetic gradient in the northwesterly

and southeasterly sections of the area of investigation. The magnetic maps are similar in character to the magnetic maps of Peninsula area, above.

The large-scale magnetic anomalies indicate the presence of a considerable mass of ferromagnetic material over a wide area. The vertical gradient map resolves the large-scale anomaly into numerous smaller anomalies. The northwesterly and southeasterly sections are separated by a river (drainage course) and are discussed separately below.

Coverage of the southeasterly section, the Ponds area, is somewhat fragmented by the presence of ponds and marshes. Surface observations of this area revealed numerous steel objects at or near the surface including auto parts, appliances, steel cables, etc. Bedrock outcrops are present in the vicinity of the ponds.

It appears likely that many or all of the small ferrous anomalies in this section may be due to this sort of ferrous debris located at or near the surface. However, the possibility of one or more steel drums cannot be discounted. A small section at the northerly edge of this area was included in the radar survey which covered the Peninsula Area. The results and correlation are included on the interpretation map of the Peninsula area.

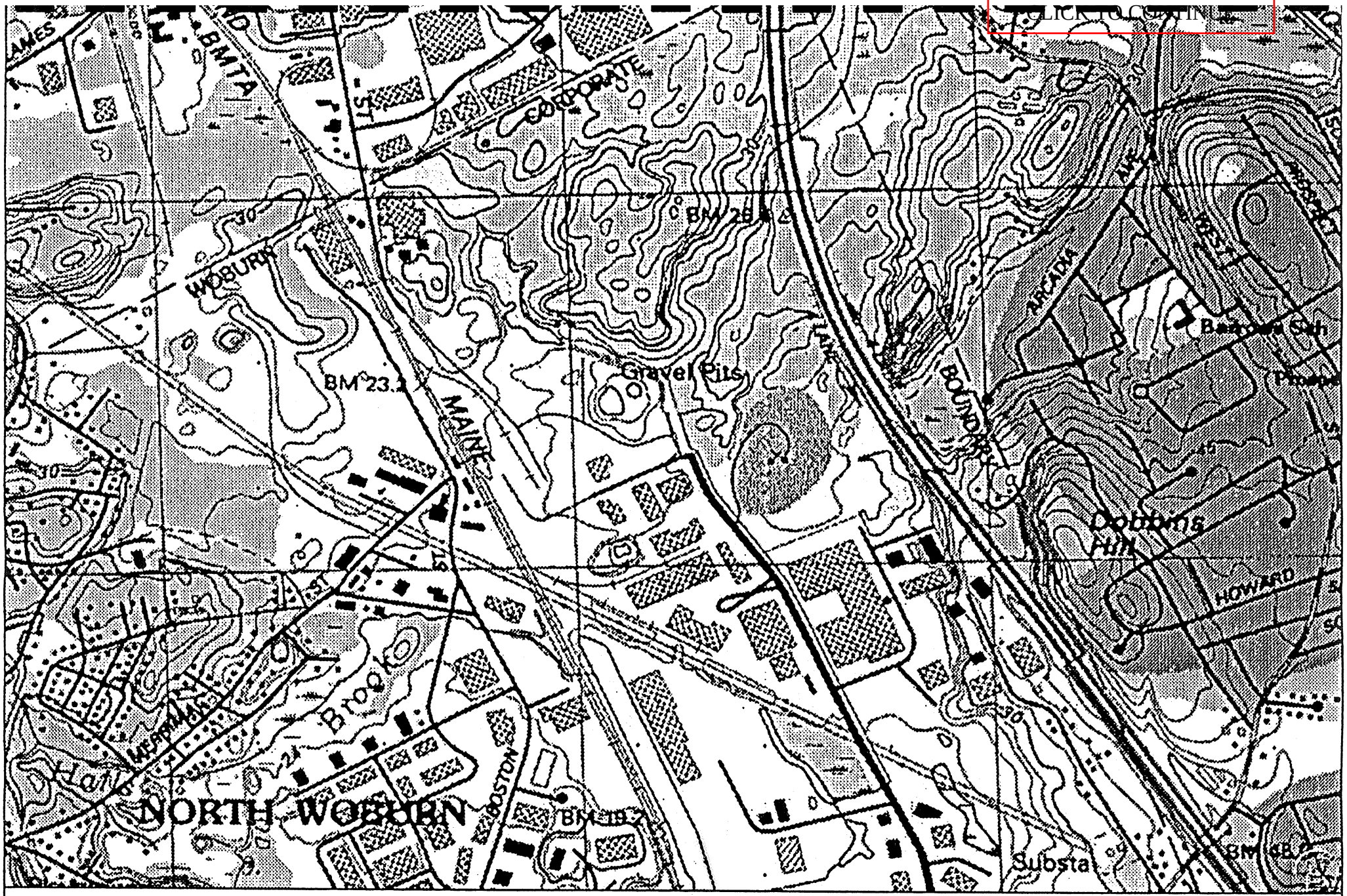
Many of the anomalies in the northwesterly section, the West of River area, are likely due to the presence of ferromagnetic objects at the surface, including chainlink fences and gates, steel reinforced cement blocks, and nearby vehicles. A magnetic anomaly centered near our grid position 95N/45W was given particular attention with the radar surveys; the results suggest a group of iron reinforced drain pipes as the source object.

5.0 CONCLUSIONS

The results of the gradiometric and ground penetrating radar surveys conducted at this facility indicate responses from known surface ferrous objects, buried ferrous objects, buried debris, disturbed ground, and shallow bedrock. Both the total field and vertical magnetic gradient contour maps aided in the generation of interpretation maps of buried ferrous objects.

Ground penetrating radar data of very good quality were collected across the surveyed area. The overall depth of penetration with GPR at this site averaged six to eight feet. The GPR survey located subsurface features indicative manmade objects, responses associated with small cylindrical objects (designated as "A" anomalies), areas of disturbed ground, and interfaces indicative of placed fill.

The subsurface complexity of the surveyed area, due to the burial of many discarded objects and shallow bedrock, control the identified magnetic and radar anomalies.



Name: READING
Date: 1/7/98
Scale: 1 inch equals 1000 feet

Location: 042° 31' 06.5" N 071° 08' 22.6" W
Caption: INDUSTRI-PLEX SITE
WOBURN, MA
B97181 FIGURE NO. 1